

We claim:

1. An optical amplifier comprising a doped fiber core and a cladding layer surrounding the core, the mode field diameter of the fiber being greater than $8\text{ }\mu\text{m}$ and the refractive index difference between the core and the cladding layer being selected such that the cut-off wavelength at which the fiber becomes single mode lies in the range 1000-1550nm.
2. An optical amplifier according to claim 1, wherein the cut-off wavelength lies between 1300 and 1450nm.
3. An optical amplifier according to claim 1, wherein the mode field diameter is between 10 and $14\text{ }\mu\text{m}$.
4. An optical amplifier comprising multiple fiber sections, a first fiber section being positioned at the input of the amplifier, and a second section being positioned at the output of the amplifier, wherein the second fiber section comprises a doped fiber core and a cladding layer surrounding the core, the mode field diameter of the fiber being greater than $8\text{ }\mu\text{m}$, and the magnitude of the radial variation of refractive index difference between the core and the cladding layer being selected such that the cut-off wavelength at which the fiber becomes single mode lies in the range 1000-1550nm, and wherein the first fiber section has a lower mode field diameter than the second fiber section.
5. An optical amplifier according to claim 4, wherein the cut-off wavelength of the second fiber section lies between 1300 and 1550nm.
6. An optical amplifier according to claim 4, wherein the mode field diameter of the second fiber section is between 10 and $14\text{ }\mu\text{m}$.
7. An optical transmission system comprising a transmitting node, a receiving node and an optical fiber link between the nodes, wherein the link includes one or more amplifying repeaters, each comprising an amplifier having a doped fiber core and a cladding layer surrounding the core, the mode field diameter of the fiber being greater than $9\text{ }\mu\text{m}$ and the refractive index difference between the core and the cladding layer being selected such that the cut-off

wavelength at which the fiber becomes single mode lies in the range 1000-1550nm.

8. An optical transmission system comprising a transmitting node, a receiving node and an optical fiber link between the nodes, wherein the link includes one or more amplifying repeaters,
5 each comprising an amplifier having two or more fiber sections, a first fiber section being positioned at the input of the amplifier, and a second section being positioned at the output of the amplifier, wherein the second fiber section comprises a doped fiber core and a cladding layer surrounding the core, the mode field diameter of the fiber being greater than 8 μm and the refractive index difference between the core and the cladding layer being selected such that the
10 cut-off wavelength at which the fiber becomes single mode lies in the range 1000-1550nm, and wherein the first fiber section has a lower mode field diameter than the second fiber section.

9. A method of designing an optical fiber comprising a core and cladding, for use in an optical amplifier, comprising the steps of:
15 selecting a core diameter such that the mode field diameter of the fiber is greater than 9 μm and such that low frequency attenuation is below desired limits;
selecting a refractive index difference between the core and the cladding layer such that the cut-off wavelength at which the fiber becomes single mode lies in the range 1000-1550nm and such that bending losses are below desired limits.

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